

SPACE SYSTEMS

NSA/C4 COMPUTER NETWORK RESEARCH LABORATORY AND THESIS RESEARCH

Herschel H. Loomis, Professor

Department of Electrical and Computer Engineering and Space Systems Academic Group

Sponsor: National Security Agency

OBJECTIVE: This effort will continue to expand and enhance the capabilities of the computer network research laboratory. Research areas of interest to the sponsor will be supported as well as an enhanced course to support the laboratory.

DoD KEY TECHNOLOGY AREAS: Computing and Software

KEYWORDS: Network, Security, Computer, Software, Information Operations

PROJECT RADIANT COPPER SURVEY

Herschel H. Loomis, Professor

Department of Electrical and Computer Engineering and Space Systems Academic Group

Sponsor: Naval Engineering Logistics Office

OBJECTIVE: In support of Project Radiant Copper, perform a survey of the limitations and capabilities of National System Processors and provide recommendations for suitability in Navy cross-platform applications.

DoD KEY TECHNOLOGY AREAS: Other (Information Operations/Information Warfare)

KEYWORDS: Geolocation, Digital Signal Processing, Computers, Software

INFORMATION CONTENT OF ONIR SIGNATURES

Herschel H. Loomis, Professor

Department of Electrical and Computer Engineering and Space Systems Academic Group

Sponsor: Center for Reconnaissance Research

OBJECTIVE: NPS to research the theoretical limits in the information content of ONIR signatures.

DoD KEY TECHNOLOGY AREA: Other (Information Operations)

KEYWORDS: ONIR Signatures

PMW 163 THESIS RESEARCH AND SIGINT II COURSE SUPPORT

Herschel H. Loomis, Professor

Department of Electrical and Computer Engineering and Space Systems Academic Group

Sponsor: Space and Naval Warfare Systems Command

OBJECTIVE: Provide technical analysis via the use of SIGINT II course and individual thesis research into shipboard cryptologic systems.

DoD KEY TECHNOLOGY AREAS: Space Vehicles

KEYWORDS: Cryptology, Information Operations, Overhead Reconnaissance, Digital Signal Processing, Navigation

SPACE SYSTEMS

NSA/K51 CRYPTOLOGIC RESEARCH LAB AND THESIS RESEARCH SUPPORT

Herschel H. Loomis, Professor

Department of Electrical and Computer Engineering and Space Systems Academic Group

Sponsor: National Security Agency

OBJECTIVE: Support for the Cryptologic Research Laboratory at the Naval Postgraduate School wherein graduate students perform research in support of K51.

DoD KEY TECHNOLOGY AREAS: Other (Information Operations)

KEYWORDS: Modulation, VSAT, COMINT, BLEEPER, Cyclostationary, Detection, Recognition, Exploitation, Protect, Network, Security, Computer, Software, Sensors

PROMOTE CRYPTOLOGIC PROGRAMS AT THE NAVAL POSTGRADUATE SCHOOL

Herschel H. Loomis, Professor

Department of Electrical and Computer Engineering and Space Systems Academic Group

Sponsor: Naval Security Group Command

OBJECTIVE: Support Cryptologic programs at the Naval Postgraduate School to enhance technical research support to the Commander, Naval Security Group.

DoD KEY TECHNOLOGY AREAS: Other (Information Warfare)

KEYWORDS: Geolocation, Digital Signal Processing, Computers, Software

PERSONNEL SECURITY TRAINING IN ACE LABORATORY

Herschel H. Loomis, Professor

Department of Electrical and Computer Engineering and Space Systems Academic Group

Sponsor: Space and Naval Warfare Systems Command

OBJECTIVE: To provide for security training on the Navy Marine Corps Internet to be conducted within the ACE lab at SPAWARSYSCEN.

DoD KEY TECHNOLOGY AREAS: Computing and Software

KEYWORDS: Network, Security, Computer, Information Operations

SPACE SYSTEMS STUDENTS THESIS RESEARCH PROJECTS, DIRECTED STUDIES AND SPACE SYSTEMS ENGINEERING EXPERIENCE TOUR

Rudolf Panholzer, Professor

Space Systems Academic Group

Sponsor: Naval Research Laboratory

SUMMARY: Funds supported six-week experience tours by officer students in the Space Systems Engineering curriculum. This project also supported Space Systems officer students engaged in the Small Satellite Design Program whose purpose is the hands-on design, development, integration, and on-orbit operation of a small satellite by officer students. Work included on-going operations of the PANSAT small satellite, which was launched into orbit in October 1998, as well as the initial design work for the follow-on project.

OBJECTIVE: The objective of this proposal is to fund Space Systems Academic Group (SSAG) students' thesis research projects, directed studies, and space systems engineering experience tours.

THESIS DIRECTED:

Robinson, M. J., "Prototype Design for NPSAT Visible Imager," Masters Thesis, Naval Postgraduate School, June 2000.

PRESENTATIONS:

Phelps, R., "A Power System Design for the Petite Amateur Navy Satellite-PANSAT," 5th International Symposium, Small Satellite Systems and Services, La Baule, France, 19-23 June 2000.

Sakoda, D., "Naval Postgraduate School Graduate Education in Space Systems Through Space Flight Experience," 5th International Symposium, Small Satellite Systems and Services, La Baule, France, 19-23 June 2000.

DoD KEY TECHNOLOGY AREA: Space Vehicles

KEYWORDS: Space Systems Engineering

FREQUENCY COLLISION PLANNING
Donald v. Z. Wadsworth, Senior Lecturer
Space Systems Academic Group
Sponsor: Naval Space Command

OBJECTIVE: Develop a set of recommendations for mitigating the military's vulnerability to RFI in UHF satellite communications. This includes how to eliminate deficiencies in RFI resolution capability in order to decrease the impact of RFI on military readiness.

SUMMARY: The initial step in this effort was to compile information on the current status of RFI with satellite systems. The results were included in the June 1999 NPS Master's Thesis by MAJ J. P. Cook. The effort to assess the future impact of RFI on satellite systems was continued in CY2000 under an extension of this research funding. That work is documented in the September 2000 Master's Thesis by LT M. A. Leslie, under the direction of Prof. Wadsworth and CDR Sue Higgins. Information and guidance was obtained from a variety of sources, including the Naval Space Command (J. Trammel and LCDR M. Leonard), SPAWAR (N. Baumgarten), U. S. Atlantic Fleet Headquarters (T. Myers), Office of Spectrum Analysis and Management (R. Cowen-Hirsch), Joint Spectrum Center, Naval Research Laboratory, and others. The recommendations cover the following topics (limited distribution specifics are omitted):

- Develop better tools and requirements for timely RFI geolocation
- Institutionalize the RFI resolution process (equipment, operational procedures, training and exercises)
- Implement RFI resolution metrics at all levels
- Establish formal agreements between organizations for geolocation support (NCTAMS, RSSCs, NSG, CINC DF assets, etc.)
- Increase awareness of criticality of spectrum and space support to the war fighter

THESIS DIRECTED:

Leslie, M. A., "Vulnerability and Impact Analysis of Radio Frequency Interference on Military Ultra High Frequency Satellite Communications," Masters Thesis, Naval Postgraduate School, September 2000.

DoD KEY TECHNOLOGY AREA: Command, Control, and Communications

KEYWORDS: Satellite, Communications, Spectrum, RFI